

In th Claims

Claims 1-37 (Canceled).

38. (Previously Presented): A deposition method comprising:
positioning a semiconductor substrate within a deposition chamber;
flowing a first precursor gas within the deposition chamber to form a first monolayer on the substrate, said first precursor gas flowing comprising a plurality of first precursor gas pulses, at least two of the plurality of first precursor gas pulses separated by a period of time when no gas is fed to the chamber;
after forming the first monolayer on the substrate, flowing a second precursor gas different in composition from the first precursor gas within the deposition chamber to form a second monolayer on the first monolayer; and
flowing multiple time spaced inert purge gas pulses within the deposition chamber intermediate the flowing of the first precursor gas and the second precursor gas.

39. (Previously Presented): The method of claim 38 wherein the plurality is two.

40. (Previously Presented): The method of claim 38 wherein the plurality is more than two.

41. (Previously Presented): The method of claim 38 comprising flowing at least one inert purge gas pulse to the substrate within the chamber immediately prior to the first precursor flowing.

42. (Previously Presented): The method of claim 38 wherein the first precursor comprises TiCl_4 and the second precursor comprises NH_3 .

43. (Previously Presented): The method of claim 38 wherein the first precursor comprises NH_3 and the second precursor comprises TiCl_4 .

44. (Previously Presented): The method of claim 38 wherein the first precursor comprises trimethylaluminum and the second precursor comprises ozone.

45. (Previously Presented): The method of claim 38 wherein the first precursor comprises ozone and the second precursor comprises trimethylaluminum.

46. (Previously Presented): The method of claim 38 wherein the period of time is less than time of gas flow of either of the two immediately adjacent first precursor gas pulses.

47. (Previously Presented): The method of claim 38 wherein the period of time is greater than time of gas flow of each of the two immediately adjacent first precursor gas pulses.

48. (Previously Presented): The method of claim 38 wherein the period of time is greater than time of gas flow of both of the two immediately adjacent first precursor gas pulses in combination.

49. (Previously Presented): The method of claim 38 wherein the two immediately adjacent pulses are equal in time.

50. (Previously Presented): The method of claim 38 wherein the two immediately adjacent pulses are not equal in time.

51. (Previously Presented): The method of claim 38 wherein the two immediately adjacent pulses are equal in time, the period of time being equal to the time of each of the immediately adjacent pulses.

52. (Previously Presented): A deposition method comprising:
positioning a semiconductor substrate within a deposition chamber;
flowing a first precursor gas within the deposition chamber to form a first monolayer on the substrate;

after forming the first monolayer on the substrate, flowing a second precursor gas different in composition from the first precursor gas within the deposition chamber to form a second monolayer on the first monolayer, said second precursor gas flowing comprising a plurality of time spaced second precursor gas pulses; and

after forming the second monolayer on the substrate, flowing a third precursor gas different in composition from the second precursor gas within the deposition chamber to form a third monolayer on the substrate, the third precursor being different in composition from the first precursor.

53. (Previously Presented): The method of claim 52 comprising at least one period of time between two adjacent second precursor gas pulses when no gas is fed to the chamber.

54. (Previously Presented): The method of claim 52 comprising at least one period of time between two adjacent second precursor gas pulses when some gas is fed to the chamber.

55. (Previously Presented): The method of claim 52 comprising at least one period of time between two adjacent second precursor gas pulses within which at least one inert purge gas pulse is fed to the substrate within the chamber.

56. (Previously Presented): The method of claim 52 wherein the plurality is two.

57. (Previously Presented): The method of claim 52 wherein the plurality is more than two.

58. (Previously Presented): The method of claim 52 wherein the plurality is two, and comprising a period of time between said two when no gas is fed to the chamber.

59. (Previously Presented): The method of claim 52 wherein the plurality is two, and comprising a period of time between said two when some gas is fed to the chamber.

60. (Previously Presented): The method of claim 52 wherein the plurality is two, and comprising a period of time between said two within which at least one inert purge gas pulse is fed to the substrate within the chamber.

61. (Previously Presented): The method of claim 52 comprising flowing at least one inert purge gas pulse to the substrate within the chamber intermediate the first precursor flowing and the third precursor flowing.

62. (Previously Presented): The method of claim 52 comprising flowing multiple time spaced inert purge gas pulses to the substrate within the deposition chamber intermediate the first precursor flowing and the third precursor flowing.

63. (Previously Presented): A deposition method comprising:
positioning a semiconductor substrate within a deposition chamber;
flowing a first precursor gas within the deposition chamber to form a first monolayer on the substrate;

after forming the first monolayer on the substrate, flowing a second precursor gas different in composition from the first precursor gas within the deposition chamber to form a second monolayer on the first monolayer, said second precursor gas flowing comprising at least two time abutting second precursor gas pulses which are characterized by different flow rates of the second precursor; and

after forming the second monolayer on the substrate, flowing a third precursor gas different in composition from the second precursor gas within the deposition chamber effective to form a third monolayer on the substrate.

64. (Previously Presented): The method of claim 63 wherein said two time abutting second precursor gas pulses are equal in time.

65. (Previously Presented): The method of claim 63 wherein a first in time of said two time abutting second precursor gas pulses is greater in flow time than that of a second in time of an immediately adjacent of said two time abutting second precursor gas pulses.

66. (Previously Presented): The method of claim 63 wherein a second in time of said two time abutting second precursor gas pulses is greater in flow time than that of a first in time of an immediately adjacent of said two time abutting second precursor gas pulses.

67. (Previously Presented): The method of claim 63 comprising flowing at least one inert purge gas pulse to the substrate within the chamber intermediate the first precursor flowing and the third precursor flowing.

68. (Previously Presented): The method of claim 63 comprising flowing multiple time spaced inert purge gas pulses to the substrate within the deposition chamber intermediate the first precursor flowing and the third precursor flowing.

69. (Previously Presented): The method of claim 63 wherein the third precursor is the same in composition as the first precursor.

70. (Previously Presented): The method of claim 63 wherein the third precursor is different in composition from the first precursor.

71. (Previously Presented): The method of claim 38 wherein the second monolayer is formed over an area of the substrate, the second monolayer being continuously formed over the area.

72. (Previously Presented): The method of claim 52 wherein the second monolayer is formed over an area of the substrate, the second monolayer being continuously formed over the area.

73. (Previously Presented): The method of claim 63 wherein the second monolayer is formed over an area of the substrate, the second monolayer being continuously formed over the area.

74. (Previously Presented): An atomic layer deposition method comprising:

positioning a semiconductor substrate within a deposition chamber;

flowing a first precursor gas to proximate the substrate within the deposition chamber to form a first layer on the substrate, said first precursor gas flowing comprising a plurality of first precursor gas pulses, at least two of the plurality of first precursor gas pulses separated by a period of time when no gas is fed to the chamber;

after forming the first layer on the substrate, flowing a second precursor gas different in composition from the first precursor gas to proximate the substrate within the deposition chamber to form a second layer on the first layer; and

flowing multiple time spaced inert purge gas pulses within the deposition chamber intermediate the flowing of the first precursor gas and the second precursor gas.

75. (Previously Presented): An atomic layer deposition method comprising:

positioning a semiconductor substrate within a deposition chamber;

flowing a first precursor gas to proximate the substrate within the deposition chamber to form a first layer on the substrate;

after forming the first layer on the substrate, flowing a second precursor gas different in composition from the first precursor gas to proximate the substrate within the deposition chamber to form a second layer on the first layer, said second precursor gas flowing comprising a plurality of time spaced second precursor gas pulses; and

after forming the second layer on the substrate, flowing a third precursor gas different in composition from the second precursor gas to proximate the substrate within the deposition chamber to form a third layer on the substrate, the third precursor gas being different in composition from the first precursor gas.

76. (Previously Presented): An atomic layer deposition method, comprising:

positioning a semiconductor substrate within a deposition chamber;

flowing a first precursor gas to proximate the substrate within the deposition chamber effective to form a first layer on the substrate;

after forming the first layer on the substrate, flowing a second precursor gas different in composition from the first precursor gas to proximate the substrate within the deposition chamber to form a second layer on the first layer, said second precursor gas flowing comprising at least two time abutting second precursor gas pulses which are characterized by different flow rates of the second precursor; and

after forming the second layer on the substrate, flowing a third precursor gas different in composition from the second precursor gas to proximate the substrate within the deposition chamber effective to form a third layer on the substrate.

77. (New): A deposition method comprising:
positioning a substrate within a deposition chamber;
flowing a first precursor gas within the deposition chamber to form a first monolayer on the substrate;
after forming the first monolayer on the substrate, flowing a second precursor gas different in composition from the first precursor gas within the deposition chamber to form a second monolayer on the first monolayer, said second precursor gas flowing comprising a volumetric gas flow rate with varies across a duration of second precursor gas flowing within the deposition chamber; and
after forming the second monolayer on the substrate, flowing a third precursor gas different in composition from the second precursor gas within the deposition chamber effective to form a third monolayer on the substrate.

78. (New): The method of claim 77 comprising flowing at least one inert purge gas pulse to the substrate within the chamber intermediate the first precursor flowing and the third precursor flowing.

79. (New): The method of claim 77 comprising flowing multiple time spaced inert purge gas pulses to the substrate within the deposition chamber intermediate the first precursor flowing and the third precursor flowing.

80. (New): The method of claim 77 wherein the third precursor is the same in composition as the first precursor.

81. (New): The method of claim 77 wherein the third precursor is different in composition from the first precursor.

82. (New): The method of claim 77 wherein the second monolayer is formed over an area of the substrate, the second monolayer being continuously formed over the area.